Universitat de Girona

AGENTS RESEARCH LAB

Architecture for multi-domain information integration

AgentLink TFG Meeting

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http://eia.udg.es/arl/

Agents Research Lab

Universitat de Girona

Outline

3. Introduction
4. Our Approach: MasUM: SUM + MasID
5. MasID Methodology
6. MasID Architecture
7. Preliminary results
8. Conclusions and open issues

1. Introduction

Motivation

– IRES Project: On the Integration Restaurant Services ACNET.02.50

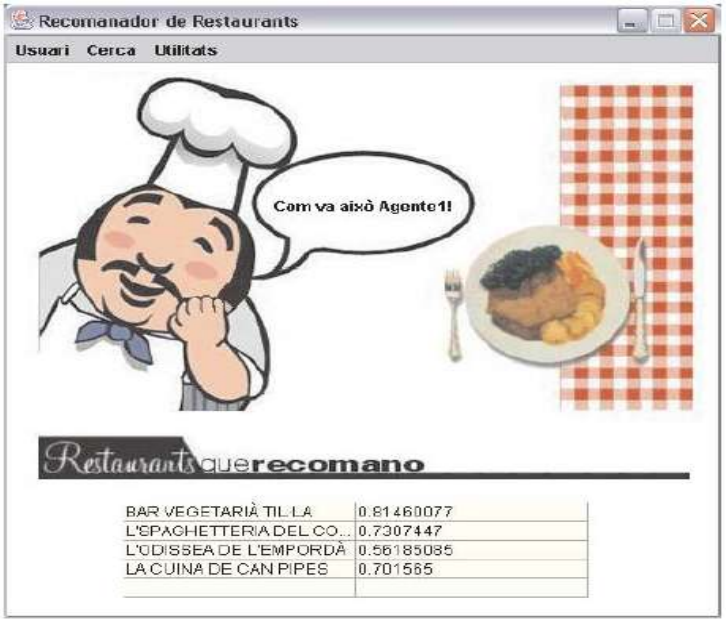
  Content-based filtering through CBR engine

  Opinion-based filtering through trust

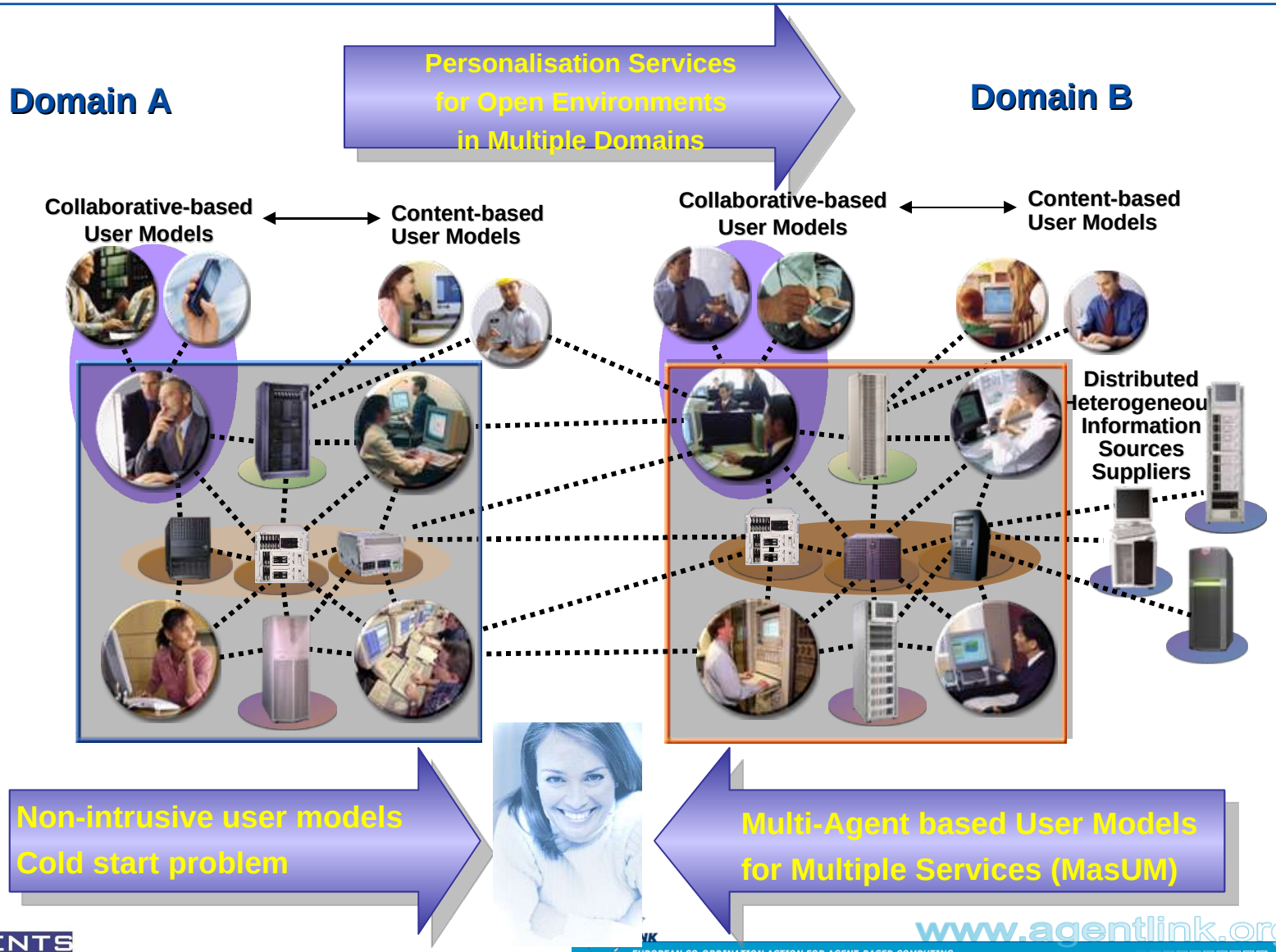
  Distributed multi-agent recommender system of service agents and personal agents

Available at: http://arlab.udg.es/

Special Prize to the best system deployed in the AgentCities network



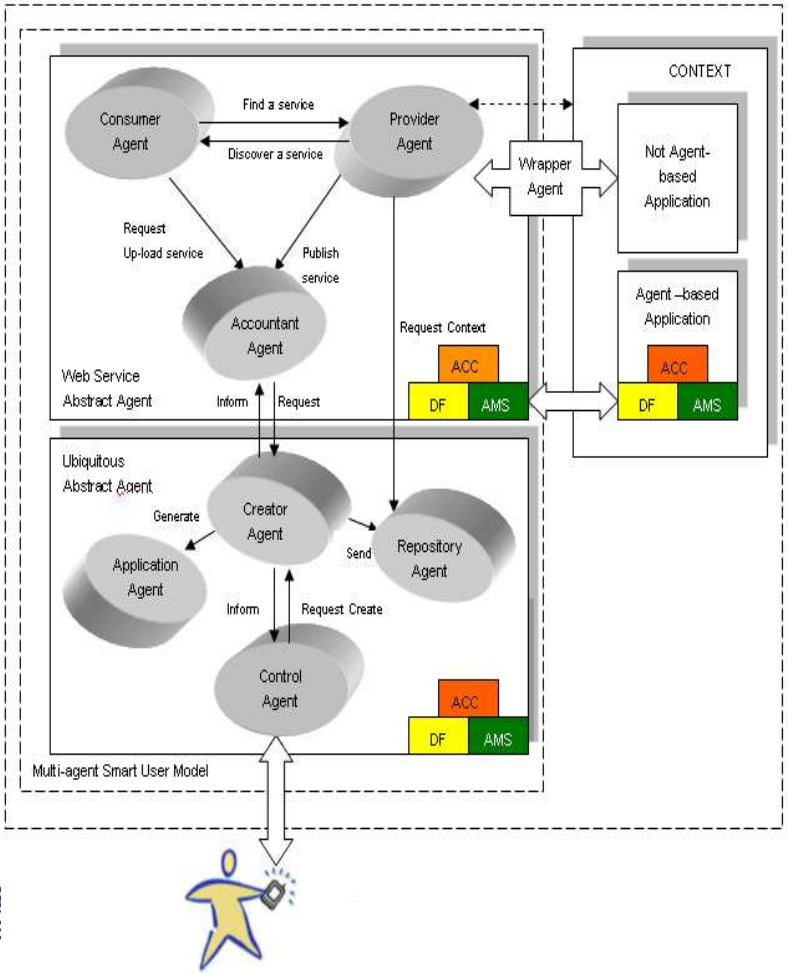
1. Introduction



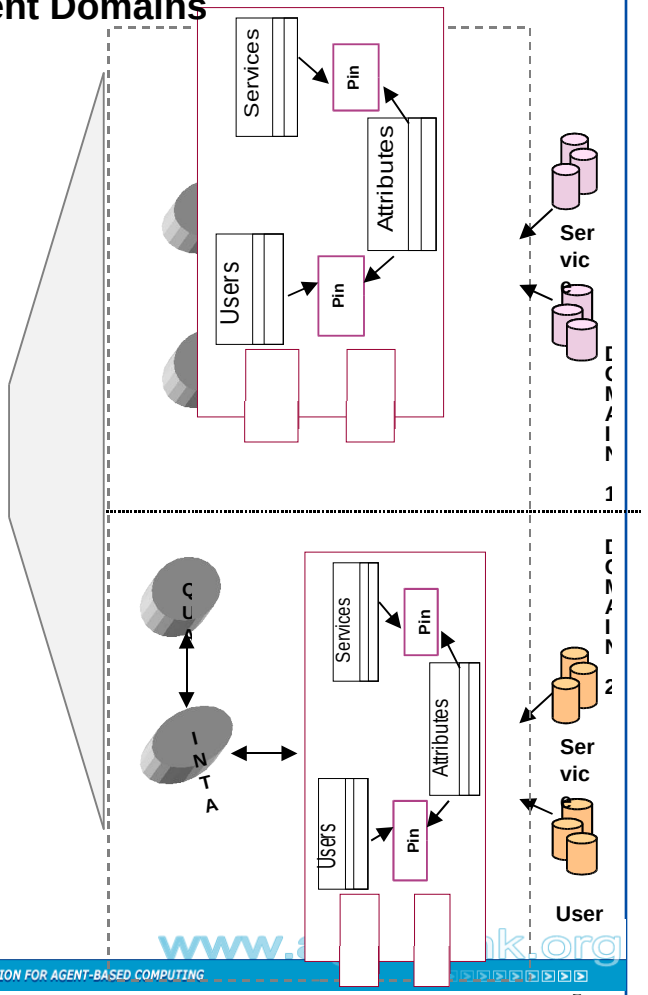
2. Our approach

Multi-agent based User Models for Multiple Services (MasUM)

SUM: Smart User Model



MasID: Multi-Agent System Integrator of Different Domains



3. MasID Methodology

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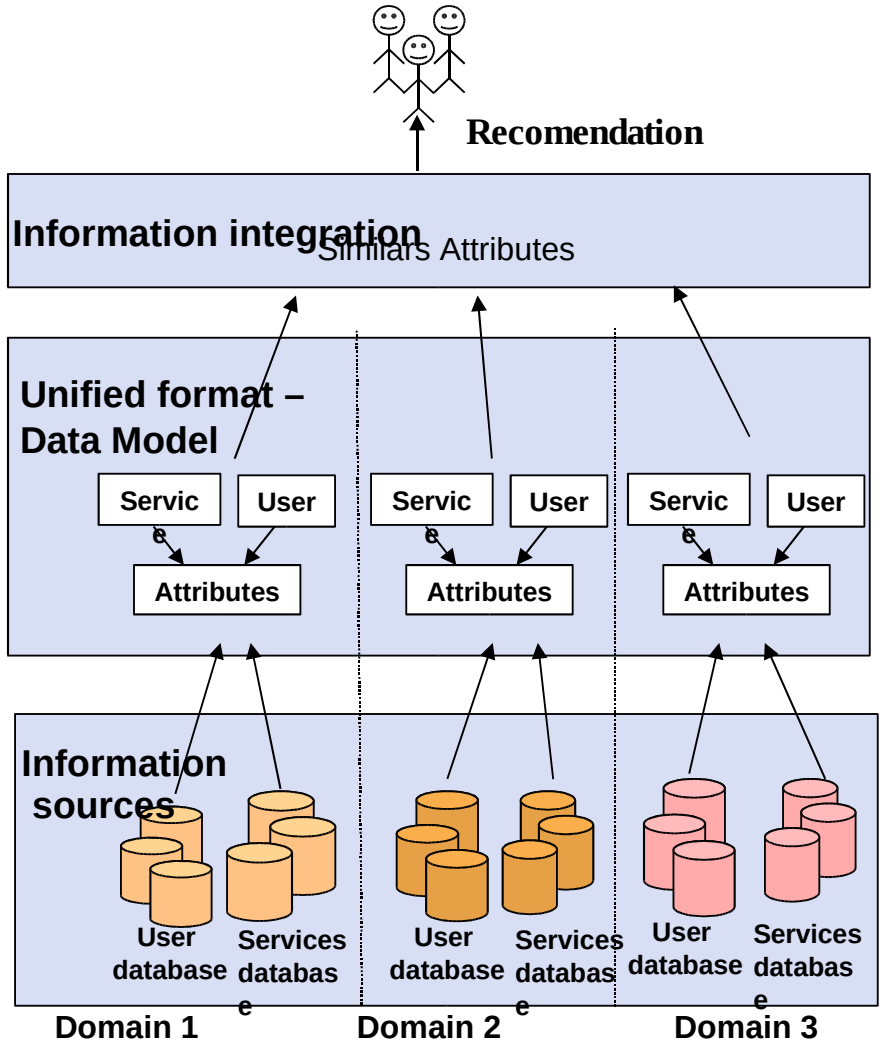
Distributed Heterogeneous Information Integration

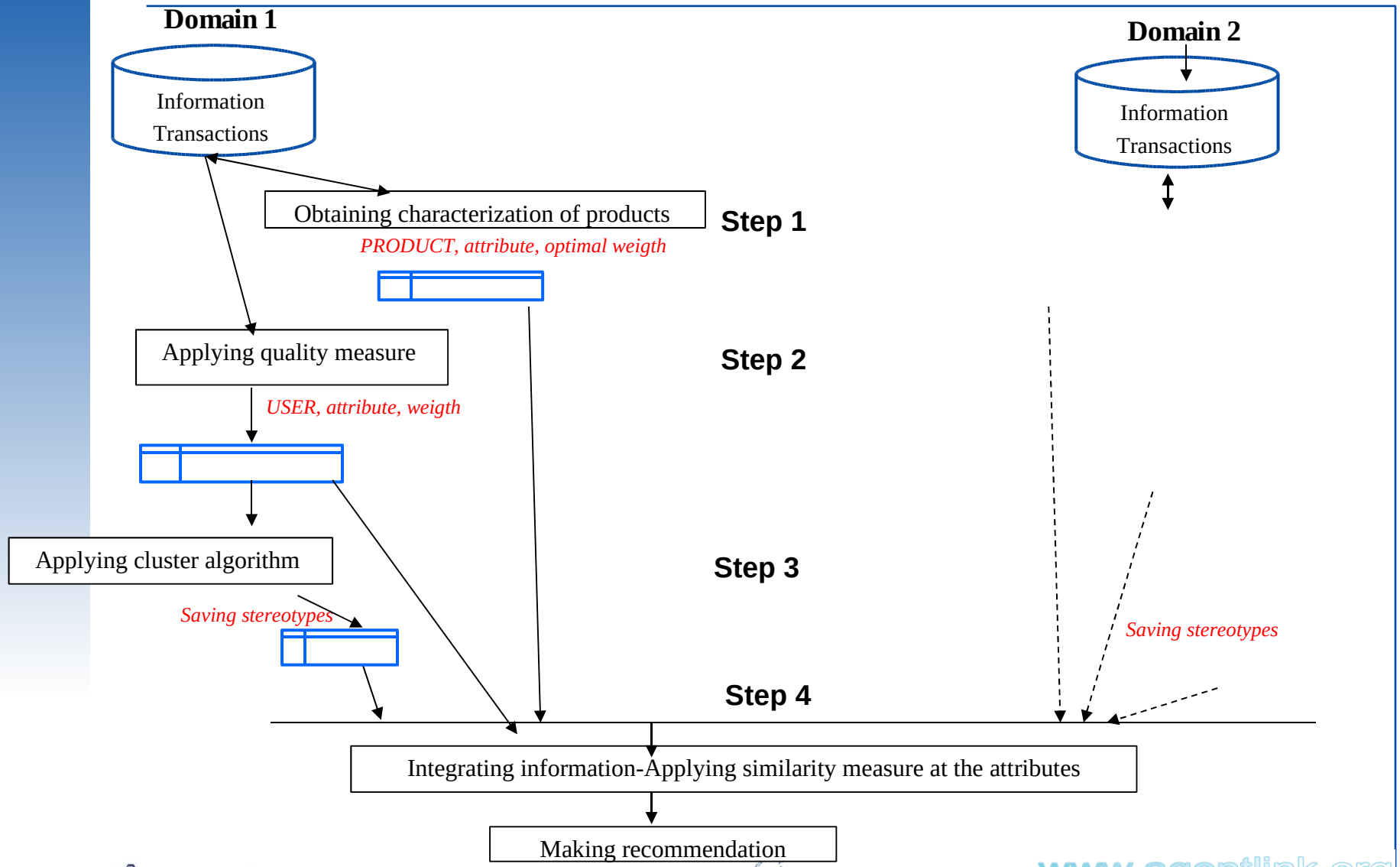
Information selection about users and services.

Heterogeneous and distributed information sources in several domains.

Information access can be established by means of relationships between the user and services.



3. MasID Methodology



3. MasID Methodology. Step 1

Log files of each user

User	Restaurant	Quality-Proce	Ambient	……	Originality
1054663018421	PIZZER-A ADRIANO	0.50	0.75		0.95
1054663018421	XINES GRAN MURALLA	0.75	0.50		0.90

User	Restaurant	Quality-Proce	Ambient	……	Originality
1032969360861	PIZZER-A ADRIANO	1	0.92		0.50
1032969360861	XINES GRAN MURALLA	0.75	0.50		0.90

User	Restaurant	Quality-Proce	Ambient	……	Originality
1033550555498	PIZZER-A ADRIANO	1	0.80		0.90
1033550555498	XINES GRAN MURALLA	0.75	0.50		0.90
1033550555498	CAN PERET	1	0.75		0.85

Restaurant	Quality-Proce	Ambient	……	Originality
PIZZER-A ADRIANO	1	0.80		0.90
XINES GRAN MURALLA	0.60	0.54		0.85
CAN PERET	1	0.75		0.75

3. MasID Methodology. Step 1

$$Q_{ij} = 1 - \sum_{i=1}^{k} \| P_{ij} - \overline{P_{Oj}} \| \cdot \log_2 \| P_{ij} - \overline{P_{Oj}} \|$$

Where

P_{ij} = weight given to the attribute j of by user i

$$\overline{P_{Oj}} = ¿ \overline{P_j} + e$$

¿

$$\overline{P_j} = ¿ \frac{\left(\sum_{i=1}^{k} P_{ij} \right)}{k}$$

¿

3. MasID Methodology. Step 2

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Log files of each user

User	Restaurant	Quality-Proce	Ambient	……	Originality
1054663018421	PIZZER-A ADRIANO	0.50	0.75		0.95
1054663018421	XINES GRAN MURALLA	0.75	0.50		0.90

User	Restaurant	Quality-Proce	Ambient	……	Originality
1032969360861	PIZZER-A ADRIANO	1	0.92		0.50
1032969360861	XINES GRAN MURALLA	0.75	0.50		0.90

User	Restaurant	Quality-Proce	Ambient	……	Originality
1033550555498	PIZZER-A ADRIANO	1	0.80		0.90
1033550555498	XINES GRAN MURALLA	0.75	0.50		0.90
1033550555498	CAN PERET	1	0.75		0.85

User	Quality-Proce	Ambient	……	Originality
1033550555498	1	0.80		0.90
1054663018421	0.75	0.50		0.90
1054663018421	1	0.75		0.85

3. MasID Methodology. Step 2

$$Q_{ij} = 1 - \sum_{i=1}^{k} \| P_{ij} - \overline{P_j} \| \cdot \log_2 \| P_{ij} - \overline{P_j} \|$$

Where

P_{ij} = weight given to the attribute j of by user i

$$\overline{P_j} = ¿ \frac{\left(\sum_{i-1}^{k} P_{ij} \right)}{k}$$

¿

3. MasID Methodology. Step 3

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Cluster of users ↙ stereotypes

User	Quality-Proce	Ambient	……	Originality
1033550555498	1	0.80		0.90
1054663018421	0.75	0.50		0.90
1054663018421	1	0.75		0.85

3. MasID Methodology. Step 4

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Open issue

Depends on:

- The user is in both domains
- Stereotypes
- Similarity measures
- Correlation measures
- ….

4. MasID Architecture

The INTegrator Agent (INTA):

Access to the data set in each domain.

Computes step 1 and 2.

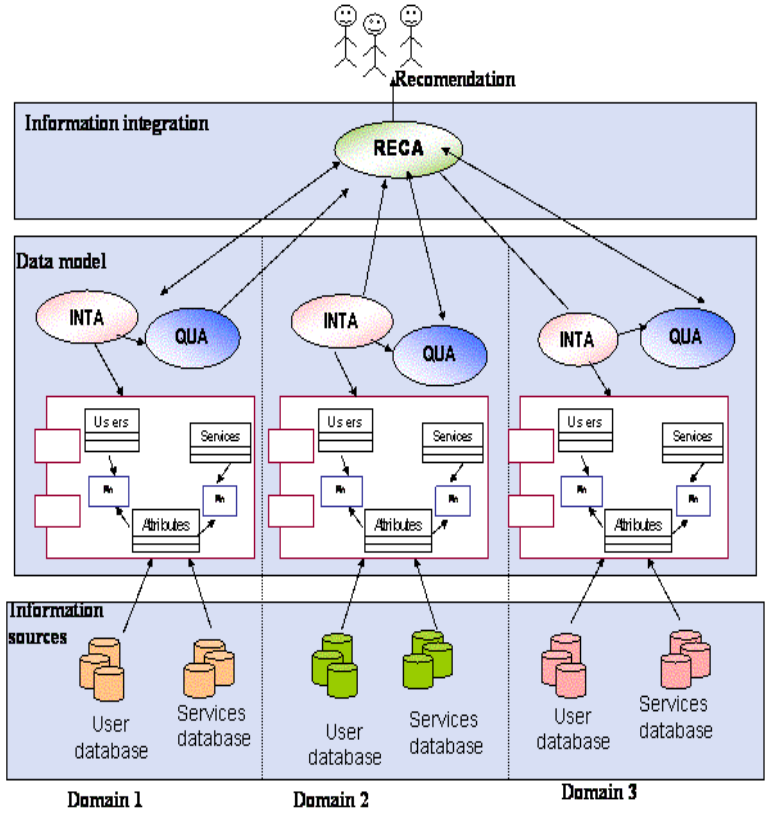
Keeping update the relation in each domain.

QUantifier Agent(QUA):

Apply the cluster algorithm (step 3)

RECommender Agent (RECA):

Computes similarities (step 4)



4. Preliminary results

In the restaurant domain the product was characterized by the optimal weight allocated to each attribute (step 1)

RESTAURANTE XINES GRAN MURALLA

ATRIBUTO		4	EPSILON						
			0,02000	0,01000	0,00000	-0,01000	-0,02000	-0,03000	-0,05000
User	Opinion								
1054584503156		0,25	0,51669	0,50984	0,50360	0,49795	0,49287	0,48834	0,48084
1054583443343		0,75	0,48729	0,49169	0,49663	0,50213	0,50822	0,51492	0,53026
1054585485843		1,00	0,51260	0,50757	0,50282	0,49836	0,49419	0,49031	0,48348
1054661014906		0,25	0,51669	0,50984	0,50360	0,49795	0,49287	0,48834	0,48084
1054663018421		1,00	0,51260	0,50757	0,50282	0,49836	0,49419	0,49031	0,48348
1033550555498		0,50	0,86215	0,90342	0,95424	0,96978	0,91496	0,87185	0,80249
1033576741311		0,75	0,48729	0,49169	0,49663	0,50213	0,50822	0,51492	0,53026
1033640425406		0,50	0,86215	0,90342	0,95424	0,96978	0,91496	0,87185	0,80249
1033641486370		1,00	0,51260	0,50757	0,50282	0,49836	0,49419	0,49031	0,48348
1033642092247		0,50	0,86215	0,90342	0,95424	0,96978	0,91496	0,87185	0,80249
1034077308426		0,25	0,51669	0,50984	0,50360	0,49795	0,49287	0,48834	0,48084
1034156833477		0,75	0,48729	0,49169	0,49663	0,50213	0,50822	0,51492	0,53026
1034766506330		0,75	0,48729	0,49169	0,49663	0,50213	0,50822	0,51492	0,53026
1034781599222		0,25	0,51669	0,50984	0,50360	0,49795	0,49287	0,48834	0,48084
1034935043442		0,25	0,51669	0,50984	0,50360	0,49795	0,49287	0,48834	0,48084
1035369276633		0,50	0,86215	0,90342	0,95424	0,96978	0,91496	0,87185	0,80249
1035467777346		0,50	0,86215	0,90342	0,95424	0,96978	0,91496	0,87185	0,80249
1053002146812		0,75	0,48729	0,49169	0,49663	0,50213	0,50822	0,51492	0,53026
1053004475218		0,50	0,86215	0,90342	0,95424	0,96978	0,91496	0,87185	0,80249
1053006866531		0,25	0,51669	0,50984	0,50360	0,49795	0,49287	0,48834	0,48084
1053013964109		0,50	0,86215	0,90342	0,95424	0,96978	0,91496	0,87185	0,80249
1035974453346		0,75	0,48729	0,49169	0,49663	0,50213	0,50822	0,51492	0,53026
1053520426234		0,25	0,51669	0,50984	0,50360	0,49795	0,49287	0,48834	0,48084
1053532107406		0,50	0,86215	0,90342	0,95424	0,96978	0,91496	0,87185	0,80249
1053620809484		0,25	0,51669	0,50984	0,50360	0,49795	0,49287	0,48834	0,48084
1070819918901		0,50	0,86215	0,90342	0,95424	0,96978	0,91496	0,87185	0,80249
1071014819870		0,50	0,86215	0,90342	0,95424	0,96978	0,91496	0,87185	0,80249
1053973943031		0,75	0,48729	0,49169	0,49663	0,50213	0,50822	0,51492	0,53026
1053974575281		0,25	0,51669	0,50984	0,50360	0,49795	0,49287	0,48834	0,48084
1054064431718		0,50	0,86215	0,90342	0,95424	0,96978	0,91496	0,87185	0,80249
1054065218359		0,75	0,48729	0,49169	0,49663	0,50213	0,50822	0,51492	0,53026
1054066507781		0,50	0,86215	0,90342	0,95424	0,96978	0,91496	0,87185	0,80249
1054067867828		0,75	0,48729	0,49169	0,49663	0,50213	0,50822	0,51492	0,53026
1037116597255		0,75	0,48729	0,49169	0,49663	0,50213	0,50822	0,51492	0,53026
Sum(Epsilon)			21,40671	21,86916	22,45798	22,63529	21,98018	21,47736	20,71047
Media		0,55147							
Optimal Weight =Media+epsilon						0,56147			

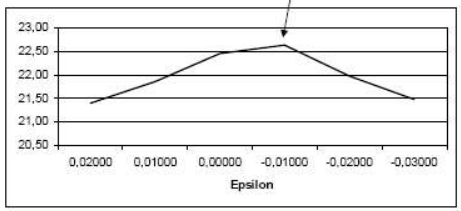


Figure 1.1 Results Restaurant Domain

5. Preliminary results

In the insurance domain the product was characterized by the weight allocated to each attribute by an expert (step 2).

(no step 1 is performed)

idcustomer	property-id-property	property-name	QNORM
2	8	Edad consumidor	0,686679378
2	17	Motivo adquisicion	0,778538127
2	18	Motivo contratacion	0,686679378
2	27	Sinergia	0,623523398
3	8	Edad consumidor	0,686679378
3	17	Motivo adquisicion	0,778538127
3	18	Motivo contratacion	0,686679378
3	27	Sinergia	0,623523398
4	8	Edad consumidor	0,686679378
4	17	Motivo adquisicion	0,778538127
4	18	Motivo contratacion	0,686679378
4	27	Sinergia	0,623523398
5	8	Edad consumidor	0,686679378
5	17	Motivo adquisicion	0,778538127
5	18	Motivo contratacion	0,686679378
5	27	Sinergia	0,623523398
6	8	Edad consumidor	0,686679378
6	17	Motivo adquisicion	0,778538127
6	18	Motivo contratacion	0,686679378
6	27	Sinergia	0,623523398
7	8	Edad consumidor	0,686679378
7	17	Motivo adquisicion	0,778538127
7	18	Motivo contratacion	0,686679378
7	27	Sinergia	0,623523398
8	8	Edad consumidor	0,686679378
8	17	Motivo adquisicion	0,778538127
8	18	Motivo contratacion	0,686679378

Table 1.1 Results Insurances Domain

6. Conclusions and future work

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Multi-domain integration information

- Methodology
- Architecture
- Preliminary results on off-line transactions and recommender system

Complete methodology

- Open issues regarding similarities across domain

Future work

- Test the integration architecture to gather user information from web services.
- Test the integration architecture to fill up the features of the Smart User Model in e-business applications
- Extend this approach to Grid environment in order to create and manage complex knowledge discovery applications composed as workflows that integrate data sets, provided as distributed services on a Grid.

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THANK YOU FOR YOUR ATTENTION!

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